Administrator's Column

(In this column NASA Activities features an article by NASA Administrator James M. Beggs. These articles focus on subjects chosen by him that address topics of broad interest to the agency's employees. The column this month features an address presented at the Georgetown University School of Foreign Service symposium on science, technology and diplomacy held in Washington, D.C.)

The Potential for Science and Technology

A few months ago, I received a telephone call. A voice explained very courteously the benefits I could receive from new insurance. And it asked me, at the tone, to provide my age, income and insurance level. This call was from a machine. I daresay this impertinence would have had me slamming the phone down if I had answered it. But I did not. I was not home and the call went into another machine — my answering machine.

So, for two minutes, two machines conversed.

Now, I am an engineer, and probably would be among the last to speak ill of or discard any of the technological wonders that decorate our lives today. Indeed, I believe strongly that technology not only pushes science forward, but has been responsible for much of the social and economic progress in the world today.

But I also believe that scientific and technological advances have come into our lives so rapidly that we tend to take them for granted. As a consequence, we forget they sometimes lack the human touch, as my little story illustrates. Clearly, if we are to use science and technology to our advantage, we have to find ways to replenish that lack, both in our interpersonal and in our international relationships.

One way, for example, is to use telecommunications technology to reinforce the bonds that join us to other times, places and people — to reaffirm our common humanity.

We need to be reminded from time to time that we share the Earth with many people and many other forms of life.

The Apollo program did this, and did it very successfully. The live television image of man's first landing on the moon on July 20, 1969, was seen around the world. It moved our Librarian of Congress, Archibald Macleish, to write a poem in which he called the world's peoples "Riders on the Earth Together." Indeed, the first photos of Earth from beyond our planet revealed to us, as nothing else could, our common heritage. They brought home to people everywhere that we are one people together, on one Earth in a vast universe. Thus, they sparked a movement — the environmental movement — to preserve and protect our natural resources.

Apollo marked our coming of age as a space-faring nation. It symbolized the increasing role of science and technology in shaping our values and our lives, not only on Earth, but in space as well.

Today, you can't pick up a newspaper or watch the television news without noticing that science and technology issues play an increasingly important role in international relations. They are the stuff of international disputes, international collaboration and international interest. In short, they have become the stuff of diplomacy. Clearly, then, they cannot be divorced from our foreign policy concerns.

Nowhere is that more apparent than in my field, the new world of space.

And yet, despite the fact that science and technology and the space program are inextricably linked to foreign policy issues, we fail to use them to full advantage as foreign policy tools. And this is because we still have no coherent and ongoing mechanism to integrate both our leadership in space and our high technology advantage into the fabric of diplomacy and foreign policy. We need to use these leverages more effectively. Indeed, I hope this symposium will address ways to overcome this very important problem.

To get a better idea of what has been happening, let's look at three critical areas of current foreign policy concerns: East-West relations; the North-South dialogue; and international cooperation. In all three, we can see how science and technology, as reflected in space technology and operations, plays a highly visible role.

As for the first — the East-West relationship — it is clear that the high ground of space has taken on a sharp profile in our relationships with the Soviet Union. The

recent Geneva talks between the United States and the Soviet Union underscored the fact that both sides have concerns about space weapons.

At the same time, both sides use space to gather information about each other and to verify compliance with vital peacekeeping agreements. And under the Outer Space Treaty of 1967, both sides even go so far as to let each other know, through the United Nations, when they have launched a satellite and where it will fly in space. Neither, however, is required to disclose the spacecraft's mission or its capabilities.

On the civil side, we have had a variety of cooperative efforts by the U.S. and the U.S.S.R. in space. The most visible was the Apollo Soyuz Test Project in 1975, during which our respective spacecraft docked in orbit.

We are also involved in a multilateral satellite-aided search and rescue system with the Soviets. The system detects ships and aircraft in trouble, and so far has been credited with saving about 300 lives. And we have had many exchanges on biomedical research findings, particularly on the human body's adaption to space flight.

Future East-West cooperation in space exploration could be a fertile field as well. Here the United States and the Soviet Union share similar interests, which extend even to sending manned expeditions to explore Mars some day. And U.S.-Soviet cooperation in such an endeavor could certainly enhance the cause of peace in the world.

Recently, President Reagan invited the Soviets to join with the United States in undertaking a joint manned mission using the Shuttle and the Salyut spacecraft. So far, the Soviets have not accepted this offer, but if they were to accept, we could probably work it into our Shuttle schedule within a year. We would like to do it, and it would demonstrate our capabilities to work peacefully together in space.

So space, as one component of science and technology, occupies a prominent role in the East-West diaglogue. And I believe it will continue to do so, well into the future.

Turning to North-South issues, it is clear, too, that Third World societies have become increasingly concerned about both the impact and promise of science and technology.

Most developing countries were not involved in space activities a decade or so ago, because they probably viewed space as an area of interest only for the developed nations. But this is no longer the case. The revolution in satellite technology has made it possible for many Third World nations to respond effectively and quickly to vital domestic communications needs.

I have already spoken of telecommunications technology as a force for greater international understanding. And nowhere is this more evident than in the relationships between the developed and the developing nations of the world. Just as a nation like Indonesia, with its thousands of islands, can unite its people and territory through communications satellites, so that technology can help to bring Indonesia and other developing nations more fully into the global community. And Third World countries are starting to use it to do just that.

The Indonesian satellite, Palapa B, is deployed from the Shuttle.

The lesser developed countries also have found that space technology can be a valuable tool for economic development. Remote sensing from space has revealed hitherto unknown sources of natural resources and even reservoirs of water to be tapped for irrigation. Crop rotation and all forms of agriculture, fishing, mining and other industries have benefited from space observations.

At the same time, the Third World has become increasingly concerned about how current and planned space systems might affect them adversely. For example, they fear that data from remote sensing satellites could be used by foreigners to identify valuable resource deposits in their countries for the

purpose of exploitation. They are also apprehensive that all the "parking places" in geosynchronous orbit will be filled by communications satellites from the developed countries before Third World nations get their fair share.

Small wonder then, that we see increased activism from Third World representatives at such forums as the International Telecommunications Union and the United Nations Committee on the Peaceful Uses of Space.

International cooperation in space — our third area of concern — is becoming increasingly important. The National Aeronautics and Space Act, which created NASA in 1958, charged the agency to cooperate with other nations in space activities and to share the benefits of space research. And we have done that. Since the Act became law, NASA has entered into more than 1,000 agreements with some 130 nations and international organizations. These relationships have covered a full spectrum of collaborative endeavors, ranging from space hardware development to sharing of mission data with scientists around the globe.

We are starting to put together the largest international space project in history — the design, development and operation of a permanently manned Space Station, which we expect to be operating in the early 1990s. President Reagan invited our friends and allies to join with us on this project, and while there are still many problems to be resolved, I am confident they will do so.

Both we and our friends agree that the Space Station will be of incalculable benefit to all participating nations.

While these examples have had to be brief, I hope my point is clear. And that is that developments in science and technology have a strong impact on virtually every broad area of traditional diplomacy. And their influence is snowballing.

And as science and technology continue to make their influence felt across the board in international affairs, the people who do the work have been affected as well. On the one hand, diplomats and foreign policy specialists have had to deal more and more with science and technology matters. And on the other, technologists and scientists have moved into areas where their work can truly influence foreign policy decisions.

Twenty-six years ago, C.P. Snow warned of an unbreachable "gulf of mutual incomprehension" between humanists and scientists in his famous Rede lecture, "The Two Cultures and the Scientific Revolution." He went on to say that this gulf is so broad that not only do the two cultures not understand each other but, like people who are tone-deaf, they don't even know what they are missing! The only way to bridge this gulf, Snow wrote, "is by rethinking our education."

And that is why this symposium is so important. It will help us to rethink education today to prepare students for tomorrow in a world where the two cultures are merging fast in the wake of our scientific and technological evolution.

I do not believe that the communications problem is as dire as it was in Snow's day. His two cultures are learning to live with each other in this ever-changing world. But, as Thomas Edison once told his associates, "There is a better way to do it. Find it."

Our challenge at this symposium and, indeed, for the future, is to find better ways to merge the two cultures in the interests of achieving our international policy goals and peace and stability in the world.

James Thurber once wrote: "It's better to ask some of the questions than to know all of the answers." With that in mind, let me pose a few questions we might want to keep in mind to guide today's discussions and our future actions.

First, let's ask ourselves how we can further reduce Snow's communications gulf between the two cultures. Scientists and engineers claim that diplomats, trained in the liberal arts, are fuzzy-minded and long-winded in getting ideas across. Diplomats, on the other hand, see their technology-trained colleagues as too detail-oriented, and tending too often to bury issues with facts and figures.

Both sides have a point. Diplomatic language can, indeed, be tedious, ambiguous and obscure at times. And scientific and technical language can be incomprehensible to those not trained to understand it. Surely, we can figure out ways to enable both sides to better understand each other.

Second — and this is related intimately to the first question — how can we better promote meaningful dialogue to allay the sensibilities and concerns of diplomats, on the one hand; and scientists and engineers, on the other; so that all can work together smoothly to promote our foreign policy goals? This symposium is a fine way to begin, and I hope we will see more events like this in the future.

Third, we need to take a good look at recruiting and training patterns. We need to ask if there are better ways to broaden and diversify the experience and educational bases of people working on both sides of the equation.

I have always believed that walking a few miles in the other person's shoes is a great way to heighten sensitivity and enhance understanding. Certainly, it never hurts to try.

Finally, we should ask: How can we create greater awareness, among practitioners and the public alike, of

the importance of our science and technology assets in advancing America's foreign policy goals?

This last question is intimately connected to the need I spoke of earlier to find ways to integrate science and technology permanently into the fabric of diplomacy.

Some people, including some scientists, engineers and diplomats, never think of our scientific and technical capabilities and products as foreign policy instruments. But they can be powerful tools, indeed, to advance our interests, our goals and our image in the world, as the space program has demonstrated.

For example, even the folks at NASA, including myself, never could have imagined the outpouring of good will and enthusiasm that greeted our Shuttle orbiter Enterprise as she toured Europe in 1983 on the back of a 747.

Hundreds of thousands packed the landing sites in Paris, Rome, Bonn and London as prime ministers and presidents came out to visit the ship. And millions more lined up along highways, in cities and in the countryside to wave and cheer as the 747 dipped low enough for a good view. It was truly a magnificant welcome and it underscored our European friends' deep admiration for America's scientific and technological achievements, as symbolized by our space program.

Clearly, President Reagan recognizes the powerful appeal of science and technology around the globe. And that is why he invited international collaboration on the Space Station.

We have found that international cooperation in space can be a strong unifying force that enhances international cooperation on Earth. Such cooperation not only expands the knowledge base, but serves the cause of international understanding, and ultimately, of peace.

Winston Churchill once said, "Science has given to this generation the means of unlimited disaster or of unlimited progress. There will remain the greater task of directing knowledge lastingly toward the purpose of peace and human good."

That task remains the greatest challenge facing this and future generations. And I have no doubts that we can meet it head-on by continuing to harness the enormous potential of science and technology, coupled with skillful diplomacy, to benefit this nation and people everywhere.

Supercomputer Building Construction Underway

NASA's Ames Research Center, Mountain View Calif., has begun construction on the Numerical Aerodynamic Simulation (NAS) Facility building, to house the world's most powerful supercomputer system.

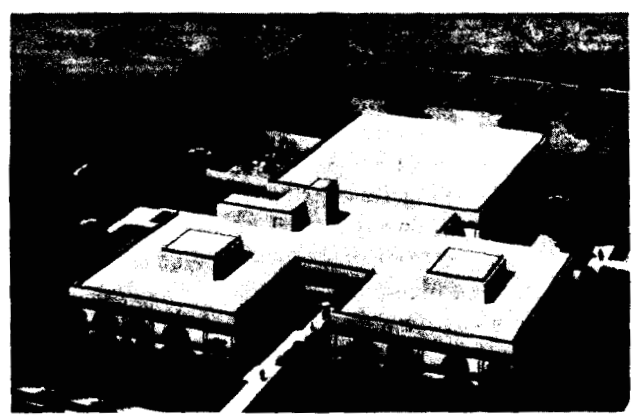
The multicomponent NAS processing system network will provide a national computational capability which will complement NASA's experimental facilities to help maintain national preeminence in aeronautical research.

At the heart of this system, high speed supercomputers will be used to solve complex aerodynamic equations which describe the fundamental fluid physics and large scale aerodynamic flows associated with aircraft flying in the Earth's atmosphere. In effect, aircraft configurations can be tested by "flying" them in the NAS supercomputer system. The NAS will reduce both the time and the costs of developing new aircraft.

Today's most advanced scientific computers do not have the speed and memory capacity to predict all aspects of aircraft performance. NASA hopes its NAS program will push the supercomputer industry to develop faster, more powerful computers to further advance aerodynamic simulation.

Another important goal of the project is to make the supercomputer network available to remote users in universities, private industry and other government research agencies nationwide. Off-site scientists will gain access to the system by satellite. Other research to be supported by NAS includes computational materials and structures, weather predictions, computational chemistry, genetic engineering and computational astrophysics.

Cray Research's Cray 2 supercomputer, with an expected operating speed of 250 million calculations per second when working aerodynamic problems, is one of



Architect's rendering of the NAS at Ames.